

Re Point IV

IV.1 This authority has determined that the international application contains a number of inventions or groups of inventions, which are not linked by a single general inventive concept (Rule 13.1 PCT), namely:

IV.1.1 Group I: claims 1, 2, 3, 4 (see IV.4.2 below), 5 (see IV.4.4. below), 6-13 Arrangement of a component with the laminated film containing a thermally conductive, non-plastic powdered filler material.

IV.1.2 Group II: claim 4 (see IV.4.3 and IV.4.3.1 below)
Arrangement of a component with the laminated film containing an electrically conductive, non-plastic filler material.

IV.1.3 Group III: claim 5 (see IV.4.5 below and IV.4.6 below)
Arrangement of a component with the laminated film containing a plastic fiber-type and a non-plastic powdered filler material.

IV.2 The reasons for this are as follows:

Reference is made to the following document:

D1: US5675310

IV.3 D1 (column 4: lines 13-28, column 5: lines 42-50, column 6: line 64 - column 7: line 7, claims 1, 3, 4, Figure 8) discloses an arrangement of an electrical component (32) on a substrate, with a film (14) comprising a plastic material being connected to the component (32) and the substrate (10) (laminated see D1: column 5: lines 41-51), such that a (planar) surface contour defined by the component (32) and the substrate (10) of the part of the film (14) is mapped, with the film (14) comprising a composite material containing a plastic material and at least one filler material that is different from the plastic. The subject matter of claim 1 and the methods in claim 10 are therefore not novel and can no longer represent a connecting common inventive concept as set out in Rule 13.1 PCT.

IV.4 The application can therefore be broken down into the following groups of claims:

IV.4.1 Claims 2 and 3: with the coefficient of thermal expansion of the composite material being adjusted to a coefficient of thermal expansion of the component.

IV.4.2 Claim 4: with the filler material being thermally conductive.

IV.4.3 Claim 4: with the filler material being electrically conductive.

IV.4.3.1 Claim 4: with the filler material being thermally and electrically conductive.

IV.4.4 Claim 5: with the filler material being in powder form

IV.4.5 Claim 5: with the filler material being in fiber form.

IV.4.6 Claim 5: with the filler material being in powder form and fiber form.

IV.4.7 Claims 6 and 7: with at least two films being applied to the component and the substrate.

IV.4.8 Claims 8 and 9: with the component being a semiconductor or a power semiconductor.

IV.4.9 Claim 11: with lamination taking place by means of vacuum-lamination.

IV.4.10 Claim 12: with a tempering step being carried out after lamination.

IV.4.11 Claim 13: with a film of polyimide, polyethylene, polyphenol, polyetheretherketone and/or epoxy resin being used.

IV.5 The features of IV.4.1, IV.4.2, IV.4.4, IV.4.7, IV.4.8, IV.4.9, IV.4.10, IV.4.11 are either disclosed by D1 or are not deemed to be inventive in respect of the disclosure in D1. Also an electrically conductive filler material is of necessity thermally conductive. Therefore no distinction is made between the disclosures in IV.4.3 and IV.4.3.1.

IV.6 A comparison of the present groups of claims with the specified document shows that the following features contribute

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to the prior art and can therefore be deemed to be special technical features according to Rule 13.2 PCT (see above IV.4.3, IV.4.3.1, IV.4.5, IV.4.6).

IV.7 Also the question arises during examination whether common special technical features possibly exist due to a technical effect.

IV.7.1 Group 1: claims 1, 2, 3, 4 (see IV.4.2), 5 (see IV.4.4.), 6-13: creation of a composite material resulting in low thermal stresses.

IV.7.2 Group II: claim 4 (IV.4.3 and IV.4.3.1) achieved object: creation of an electrically conductive connection that can be laminated.

IV.7.3 Group III: claim 5 (IV.4.5 and IV.4.6) achieved object: creation of a composite material with a low percolation limit.

IV.8 This shows that there is no corresponding technical effect (IV.7.1 - IV.7.3) either. This shows that there is no technical inter-relationship either based on the objects underlying the respective inventions or their solutions defined by the special technical features of each invention.

V. Re Point V in respect of group I: claims 1, 2, 3, 4 (see IV.4.2), 5 (see IV.4.4.), 6-12 and 13.

V.1 Reference is made to the following documents:

D1: US5675310
D2: US5637922
D3: US6541378

V.2 "On a substrate" or in a recess

In claim 1 it is disclosed that a component is disposed on a substrate. "On a substrate" means that the component is in contact with one of the limiting surfaces of the substrate. This means that a component in a recess in the substrate is also disposed on the substrate, as the bottom of the recess is also simply a limiting surface of the substrate. Therefore the semiconductor components (32) disclosed in D1 (Figure 8) are also disposed on a substrate (10).

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V.2 Novelty (Art. 33(2) PCT) claims 1 and 10

V.2.1 D1 (column 4: lines 13-28, column 5: lines 42-50, column 6: line 64 - column 7: line 7, claims 1, 3, 4, Figure 8) discloses an arrangement of an electrical component (32) on a substrate, with a film (14) comprising a plastic material being connected to the component (32) and the substrate (10) such that a (planar) surface contour defined by the component (32) and the substrate (10) of the part of the film (14) is mapped, with the film (14) comprising a composite material containing a plastic material and at least one filler material that is different from the plastic. Therefore claim 1 does not appear to satisfy the requirements of Article 33(2) PCT.

V.2.2 D1 (column 4: lines 13-28, column 5: lines 41-51, column 6: line 64 - column 7: line 7, Figure 8) discloses a method for producing an arrangement with the method steps:

- a) preparation of an arrangement of at least one electrical component (32) on a substrate (10) and
- b) laminating the film with the composite material onto the component and the substrate, such that the (planar) surface contour formed by the component and the substrate is mapped in the surface contour of the film. Therefore claim 10 does not appear to satisfy the requirements of Article 33(2) PCT.

V.3 The dependent claims 2-3, 4(IV.4.2), 5(IV.4.4), 6-13 contain no features, which in combination with the features of any claim to which they relate, satisfy the requirements of the PCT in respect of novelty and inventive step. The reasons for this are as follows:

V.3.1 D1 (column 4: lines 13-28) discloses that the film (14) is filled with alumina particles. Therefore claims 2, 3 and 4 (see IV.4.2), 5 (see IV.4.4) do not appear to satisfy the requirements of Article 33(2) PCT.

V.3.2 D1 (Figure 8) discloses an arrangement, in which at least one further film is present and at least one further part of the further film is connected to the component and the substrate such that the (planar) surface contour of the component and the substrate is mapped in a further surface contour of the further part of the further film. Therefore claim 6 does not appear to satisfy the requirements of Article 33(2) PCT.

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V.3.3 D1 (column 4: lines 13-28) discloses composite material films with two different filler materials (alumina and mica). Both types of film would automatically be used, thereby arriving at the subject matter of claim 7. Therefore claim 7 does not appear to satisfy the requirements of Article 33(3) PCT.

V.3.4 D1 (column 4: lines 13-28, column 5: lines 41-51, column 6: line 64 - column 7: line 7, Figure 8) discloses that the component (32) is a semiconductor component. Therefore claim 8 does not appear to satisfy the requirements of Article 33(2) PCT.

V.3.5 D2 (Fig.2) discloses that the semiconductor component and the power semiconductor selected from the MOSFET, IGBT and/or bipolar transistor group are connected by means of HDI MCM-L. The person skilled in the art would automatically use the film described in D1 for power semiconductors. Therefore claim 9 does not appear to satisfy the requirements of Article 33(3) PCT.

V.3.6 D3 (column 7: line 54 - column 8: line 12) discloses that films in an HDI MCM-L are laminated into place by vacuum-lamination. The person skilled in the art would automatically use this method to prevent air inclusions during lamination. Therefore claim 11 does not appear to satisfy the requirements of Article 33(3) PCT.

V.3.7 D1 (column 6: lines 59-64) discloses that a tempering step is carried out after the film has been laminated into place. Therefore claim 12 does not appear to satisfy the requirements of Article 33(2) PCT.

V.3.8 D1 (claims 1, 3, 4) discloses that a film and/or a further film with at least one plastic selected from the polyimide, polyethylene, polyphenol, polyetheretherketone and/or epoxy resin group is used. Therefore claim 13 does not appear to satisfy the requirements of Article 33(2) PCT.

V.4 Re point V in respect of group II: claim 4 (see IV.4.3 and IV.4.3.1 above)

V.4.1 Reference is made to the following document:
D4: US4811081

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V.4.2 The document D4 (column 3: lines 15-33, column 4: lines 53-58, Figure 7), which discloses all the features of claim 1, also discloses that the film (36, 42, 44) contains an electrically conductive filler material that is different from plastic. Therefore the subject matter of claim 4 does not appear to satisfy the requirements of Article 33(2) PCT.

V.5 Re point V in respect of group III: claim 5 (see IV.4.5 and IV.4.6 above):

V.5.1 Reference is made to the following documents:

D4: US4811081

D5: GB2269059

V.5.2 The person skilled in the art would automatically use the alternative anisotropic adhesive disclosed in D5 (page 2: lines 14-19, page 4: lines 11-33) with carbon fibers and metallic particles in D4 (column 5: lines 44-51), thereby reducing the resistance in the anisotropic adhesive compound, thereby arriving automatically at the subject matter of claim 5. Therefore the subject matter of claim 5 does not appear to satisfy the requirements of Article 33(3) PCT.